



# PROCEEDINGS OF THE TWELFTH ANNUAL ACQUISITION RESEARCH SYMPOSIUM

---

## WEDNESDAY SESSIONS VOLUME I

### **The Experience of Acquisition Program Managers Thinking Strategically in a Volatile, Uncertain, Complex, and Ambiguous (VUCA) Environment**

Dale Moore, NAWCAD

**Published April 30, 2015**

Disclaimer: The views represented in this report are those of the author and do not reflect the official policy position of the Navy, the Department of Defense, or the federal government.



ACQUISITION RESEARCH PROGRAM  
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY  
NAVAL POSTGRADUATE SCHOOL

<b>Report Documentation Page</b>			<i>Form Approved OMB No. 0704-0188</i>	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE <b>30 SEP 2015</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-2015 to 00-00-2015</b>		
4. TITLE AND SUBTITLE <b>The Experience of Acquisition Program Managers Thinking Strategically in a Volatile, Uncertain, Complex, and Ambiguous (VUCA) Environment</b>				
5a. CONTRACT NUMBER				
5b. GRANT NUMBER				
5c. PROGRAM ELEMENT NUMBER				
6. AUTHOR(S)				
5d. PROJECT NUMBER				
5e. TASK NUMBER				
5f. WORK UNIT NUMBER				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Naval Air Warfare Center-Aircraft Division, 22347 Cedar Point Road, Building 2185, Suite 3250, Patuxent River, MD, 20670-5304</b>				
8. PERFORMING ORGANIZATION REPORT NUMBER				
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				
10. SPONSOR/MONITOR'S ACRONYM(S)				
11. SPONSOR/MONITOR'S REPORT NUMBER(S)				
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>				
13. SUPPLEMENTARY NOTES				
14. ABSTRACT <b>Strategic thinking is a highly complex cognitive process that is intended to guide actions behaviors, decisions, and planning by taking a holistic view of the internal and external environment. Leaders today are increasingly challenged by the complexity and dynamic nature of the environment coupled with the uncertainty and ambiguity with which they need to effectively operate. Often, under these conditions, the tactical demands of day-to-day activities can represent obstacles or constraints to effective strategic thinking. A phenomenological study of leaders in a volatile, uncertain, complex, and ambiguous (VUCA) environment was conducted to understand their experiences in terms of what is happening and how it is occurring, as well as to investigate the triggers for strategic thinking, what strategic questions are being asked, and how insights are formed. This research identified four key themes and 12 aspects of the experience of strategic thinking in the context of a VUCA environment.</b>				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>22</b>
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	19a. NAME OF RESPONSIBLE PERSON	

The research presented in this report was supported by the Acquisition Research Program of the Graduate School of Business & Public Policy at the Naval Postgraduate School.

To request defense acquisition research, to become a research sponsor, or to print additional copies of reports, please contact any of the staff listed on the Acquisition Research Program website ([www.acquisitionresearch.net](http://www.acquisitionresearch.net)).



ACQUISITION RESEARCH PROGRAM  
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY  
NAVAL POSTGRADUATE SCHOOL

# The Experience of Acquisition Program Managers Thinking Strategically in a Volatile, Uncertain, Complex, and Ambiguous (VUCA) Environment

**Dale Moore**—is the Director of the Strategic Cell for the Naval Air Warfare Center–Aircraft Division (NAWCAD). He is responsible for strategic plans and strategies to enable NAWCAD to succeed in the future. Dr. Moore holds a doctorate in education from The George Washington University, an MS in product development from the Naval Postgraduate School, and a BS in mechanical engineering from the University of Delaware, and is a Certified Acquisition Professional and a graduate of the Defense Acquisition University Program Manager's Course. Dr. Moore is the recipient of two Meritorious Civilian Service Awards. [dale.moore@navy.mil]

## Abstract

Strategic thinking is a highly complex cognitive process that is intended to guide actions, behaviors, decisions, and planning by taking a holistic view of the internal and external environment. Leaders today are increasingly challenged by the complexity and dynamic nature of the environment coupled with the uncertainty and ambiguity with which they need to effectively operate. Often, under these conditions, the tactical demands of day-to-day activities can represent obstacles or constraints to effective strategic thinking. A phenomenological study of leaders in a volatile, uncertain, complex, and ambiguous (VUCA) environment was conducted to understand their experiences in terms of what is happening, and how it is occurring, as well as to investigate the triggers for strategic thinking, what strategic questions are being asked, and how insights are formed. This research identified four key themes and 12 aspects of the experience of strategic thinking in the context of a VUCA environment.

## Introduction

Organizational leaders face the increasingly difficult challenge of staying competitive and keeping pace with an unprecedented rate of change, complexity, and uncertainty in their environments (Chermack, 2011; De Kluyver, 2000; Hamel & Prahalad, 1994; MacKay & Costanzo, 2009; Tovstiga, 2010; Tsoukas & Shepherd, 2004; Zaccaro & Klimoski, 2001). As new challenges, profound opportunities, and unanticipated disruptions rapidly emerge, evolve, and are diffused across the global environment, leaders across society find themselves searching for new solutions, strategies, and tools to facilitate their organization's success (Chermack, 2011; MacKay & Costanzo, 2009; Tovstiga, 2010; Tsoukas & Shepherd, 2004). Zaccaro and Klimoski (2001) suggested that "the complexity of the senior leader's operating environment requires considerable cognitive resources to build the frame of reference that provides the rationale for organizational strategy" (p. 7). As these conditions continue to evolve, the research literature is limited in addressing the experience of how strategic thinking in this complex environment occurs, including the nature of strategic questions, the triggers for strategic thinking, and how insights are formed (Bonn, 2005; Casey & Goldman, 2010; Goldman, 2008; Hanford, 1995; Jacobs & Heracleous; 2005; Mintzberg, Ahlstrand, & Lampel, 1998; Tovstiga, 2010, 2013).

This qualitative research study (Moore, 2014) focused on this complex and emergent leadership challenge by investigating the phenomenon of leaders' experience when they think strategically in complex environments. Increasingly, complex environments require leaders to continuously make sense, to filter and transform the salient information into foresight, and to envision the future possibilities and probabilities that consider linear and nonlinear dynamics, emergent disruptions, and high degrees of uncertainty (Johnson, Daniels, & Huff, 2001; MacKay & Costanzo, 2009; Mintzberg et al., 1998; Tovstiga, 2010;



Tsoukas & Shepherd, 2004; Voros, 2003). These complex contexts require strategic thinking that “leads to the generation of strategically relevant insight” to successfully guide and sustain competitive organizations (Tovstiga, 2010, p. viii).

This study investigated the experience of strategic thinking among leaders supporting major Department of Defense (DoD) acquisition programs. Despite the title of “manager,” DoD acquisition program managers and deputy program managers occupy positions in which they are expected to perform in a leadership role. Leadership for this study is defined as “the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives” (Yukl, 2010, p. 8).

In the DoD, the complexity of acquisition development programs has increased significantly over recent history as the “complexity of this system of systems combined with the magnitude of personnel, activities and funding involved in its operation can result in problems” (Schwartz, 2010, p. i). Within this environment, the structure that DoD uses to plan, execute, and oversee acquisition activities is a multivariate “system of systems” composed of the requirements, resource allocation, and acquisition systems (Schwartz, 2010, p. i). The U.S. Army (1998) has described this environment as “marked by volatility, uncertainty, complexity, and ambiguity (VUCA)” (p. 1). For the purposes of this study, the terms complex and VUCA are used interchangeably to reflect these acquisition program management environmental conditions.

To date, specific and detailed guidance is available regarding the guidelines and framework components and the overall approach to DoD acquisition strategy. However, little research (Chermack, 2011; Tovstiga, 2010, 2013; Vidal & Marle, 2008; Weick, 1995; Yargar, 2008) has been conducted to examine the experience of leaders on the front lines when they think strategically about the future of their programs to answer the key strategic questions in developing the program acquisition strategy under these VUCA conditions. Chermack (2011) acknowledged the challenges of this rapidly evolving environment and noted a rise in uncertainty and turbulence that leaders need to consider. Tovstiga (2010) suggested that strategic questions are triggered by challenges or problems associated with the core purpose of the organization and its ability to compete and create value. Strategy is about asking the right questions and finding the right answers at the requisite level to support the higher-level or grand strategy being pursued by the organization. For this study, strategy is defined as “the determination of the basic long-term goals and objectives of the enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out those goals” (Chandler, 1962, p. 13).

## Purpose and Research Question

The purpose of this qualitative research study was to understand the experience of leaders when they think strategically in complex environments, where complex environments are characterized by VUCA. For purposes of this study, strategic thinking was defined as the cognitive phenomenon (Heracleous, 1998; Liedtka, 1998; Mintzberg, 1978, 1994, 1995; Mintzberg et al., 1998; Spender & Eden, 1998; Walsh, 1995) focused on strategic questions (Hamel & Prahalad, 1994; Koch, 2006; MacKay & Costanzo, 2009; Mintzberg et al., 1998; Tovstiga, 2010, 2013; Weber, 1984; Zabriskie & Huellmantel, 1991), using sensemaking (Bonn, 2001; Graetz, 2002; Hanford, 1995; Tovstiga, 2010, 2013; Weick, 1995) and foresight (Bonn, 2001; Chermack, 2011; Conway & Voros, 2003; Goldman, 2008; Graetz, 2002; Hanford, 1995; Heracleous, 1998; Liedtka, 1998; Mintzberg, 1995; Tovstiga, 2010, 2013) to develop novel strategies (Bonn, 2005; Goldman, 2008; Graetz, 2002; Heracleous, 1998; Mintzberg, 1978, 1998; Tovstiga, 2010, 2013).



The main research question for this study was, what is the experience of leaders when they think strategically in a VUCA environment? There were two subquestions:

- a. What happens when leaders think strategically in a VUCA environment?
- b. How does thinking strategically in a VUCA environment occur?

Of specific interest were the triggers of strategic thinking, the strategic questions being asked, and the methods used to develop insight.

## **Conceptual Framework**

The conceptual frame for this study comprises contributions from the strategy and cognition literature, as well as the literature that sets the environmental context for the setting in which strategic thinking is occurring. The strategy literature has guided this study toward the importance of strategy formation (Mintzberg et al., 1998) and strategic thinking (Bonn, 2001; De Kluyver, 2000; Goldman, 2008; Graetz, 2002; Hanford, 1995; Heracleous, 1998; Liedtka, 1998; Mintzberg, 1995; Tovstiga, 2010; Weber, 1984; Zabriskie & Huellmantel, 1991) to address strategic questions (Andrews, 1980; Hamel & Prehalad, 1994; Koch, 2006; Porter, 1980; Tovstiga, 2010). The organizational, managerial, cognition, and strategy literature all suggest that strategic thinking includes changing an individual's mental models, which shape and guide thinking processes (Barr, Stimpert, & Huff, 1992; Bonn, 2005; Craik, 1943; Doyle & Ford, 1999; Jones et al., 2011; Mintzberg et al., 1998; Morecroft, 1992; Tovstiga, 2010).

The cognition literature includes the sensemaking processes that enable meaning making of new information, which is placed into context to support foresight (Weick, 1995). The cognition literature further highlights the increasing importance of using foresight as changes in the environment become more rapid (Makridakis, 2004), indicating that foresight as an element of strategic thinking is concerned with exploring (based on limited data) and developing options in response to strategic questions (Voros, 2003). Further, the strategy literature acknowledges that sensemaking supports the answering of strategic questions in the strategy formation process (Tovstiga, 2010) and that thinking strategically involves foreseeing discontinuities from all dimensions relevant to strategy (Mintzberg, 1995). Within the conceptual frame, sensemaking, foresight, and strategic questions interact to form the strategy and cognition literature foundation for understanding the experience of leaders when they think strategically in a VUCA environment.

These constructs come together as the literature in strategy acknowledges an increasing concern about the future (MacKay & Costanzo, 2009). Understanding the future through foresight, defined as "a process by which one comes to a fuller understanding of the forces shaping the long-term future which should be taken into account in policy formulation, planning and decision making" (Georghiou et al., 2008, p. 7) is an aspect of strategic thinking (Voros, 2003) that helps make sense of the future to achieve a sustainable competitive position (Cornish, 2004). These formidable considerations require the requisite cognitive capabilities and processes, made even more challenging as they are performed within complex contemporary project management environments (Vidal & Marle, 2008) which have been characterized as VUCA (U.S. Army, 1998). The literature across strategy and cognition comprises the conceptual frame, which includes the requisite constructs and their relationships to address the research question.

## **Methodology**

The methods for this research followed a constructionist epistemology, which has the view that "all knowledge, and therefore all meaningful reality as such, is contingent upon



human practices, being constructed in and out of interactions between human beings and their world, and developed and transmitted within an essential social context" (Crotty, 2007, p. 42). The literature review for this study suggested the applicability of qualitative research based on specific criteria (Creswell, 2007) with a constructionist epistemology and phenomenology as the theoretical perspective per Merriam (2009).

The research focused on individuals who experienced thinking strategically in complex environments that occur in the naval aviation acquisition community. This community is representative of the larger DoD acquisition community, whose complex challenges have been identified as significant in U.S. government reports (Schwartz, 2010). In addition, the researcher had local access to this community. The researcher used executive-level referral sources from the three naval aviation program executive offices to identify program managers and deputy program managers who met three selection criteria: (1) performed in a senior acquisition program management role, to include program manager or deputy program manager positions, for over two years; (2) operated at a senior level of the organization (military 0-6/civilian GS-15 or equivalent and above) with significant fiduciary responsibility; and (3) was involved with and responsible for developing and conceptualizing long-term acquisition program strategies and plans.

Data were collected through three 90-minute in-depth interviews, which were transcribed to capture "the lived experience of other people and the meaning they make of that experience" (Seidman, 2006, p. 9). From the initial interview, cognitive maps, defined as "graphic representations that locate people in relation to their information" (Fiol & Huff, 1992, p. 267), were developed and refined to represent the participants' strategic thinking experience. Huff and Jenkins (2002) further defined cognitive maps as a "visual representation that establishes a landscape, or domain," "names the most important entities that exist within that domain," and "simultaneously places them within two or more relationships" (p. 2). These maps were used during subsequent interviews as a triggering mechanism and as a point of departure to coalesce inputs and build a reference for thinking strategically in a VUCA environment (Huff & Jenkins, 2002; Weick & Bougan, 1986).

Data were then coded and analyzed to answer the research question: What is the experience of leaders when they think strategically in a VUCA environment? The study used as a guide Moustakas's (1994) framework for phenomenological interview data analysis, which is a modification of the Stevick-Colaizzi-Keen method of analysis.

## **Findings**

This section describes the findings of a qualitative, phenomenological study involving 10 participants who met the specified criteria for this study related to experience with strategic thinking in an environment "marked by volatility, uncertainty, complexity, and ambiguity (VUCA)" (U.S. Army, 1998, p. 1). The findings were derived from 30 in-depth interviews (three with each participant) conducted over a six-month period, followed by eight months of data reduction, analysis, and synthesis. The composite findings described in this section include the participants' characterization of their environment and how it triggers strategic thinking, the definition of strategic thinking, and the four themes that emerged from the research.

### ***Characteristics of the Environment***

Participants described their environment as a battleground that was chaotic, volatile, uncertain, dynamic, bureaucratic, and complex.



**Battleground.** “It’s like a battleground in terms of very difficult to do things because you’re always constrained by something. … The organization is kind of a battleground—it’s kind of a brick wall or a sieve.”

**Chaotic.** “This year is extremely chaotic, and so the work that we’re doing, the flow in between strategy and tactics is being driven by the chaotic nature”; “The environment is … the chaotic nature of what we do.”

**Volatile.** “You just don’t seem like you have any stability, and it’s really hard to lead a team when there’s no stability. … Trying to understand the volatility of what’s going on and then being able to convey that to the team is just even more important under these circumstances.”

**Uncertain.** “Six months earlier we didn’t have all the fiscal uncertainty and budgetary uncertainty going on right now”; “You have to assume that there’s uncertainty. There’s never certainty in anything we do. … It contributes to the overall risk and opportunity field”; “We know the future is uncertain. … The only thing that is certain is the uncertainty.”

**Dynamic.** “[We’re] in the middle of one of the most dynamic fiscal environments that we’ve experienced in a long time;” and “Dynamic’ is probably the only term that does it justice. It’s constantly changing from an oversight standpoint, from a policy standpoint, from an industry standpoint, from an organizational focus standpoint.”

**Bureaucratic.** “In a government organization with processes and especially in our somewhat bureaucratic business, innovation doesn’t necessarily occur naturally”; and “This world that we live in has multiple layers of bureaucracy. … The entrenched methods … it’s an underlying theme.”

**Complex.** “It’s highly complex. We’re trying to spend a whole lot of money on things that are more and more complex”; “A lot of people call it [the environment] complex. I think it is complex”; “There’s a tremendous volume of things going on, so that obviously is a challenge.”

The terms participants used to describe their environment reflected an overall lack of stability and predictability coupled with intrinsic organizational impediments, such as bureaucracy, that hinder an organization’s adaptation to the environment. These descriptions of the environment express the difficult challenges of making sense, thinking ahead, planning for the future, as well as adapting to unforeseen circumstances. Participants experienced the need for planning to support program activities; however, as plans were developed and matured, changes in the environment could make them obsolete.

### **Triggers to Strategic Thinking**

Participants described a variety of triggers that catalyze strategic thinking from having responsibility, to discussions and problems that need solving, to changes in the environment, and preparation for upcoming events.

#### **Responsibility**

Having the responsibility of the position that participants held as leaders for their overall program provided an impetus for triggering strategic thinking. A participant commented,

Just being put in the seat [of a program manager] is really the trigger. … If you know you’re in charge—and it’s very clear, the statutes that govern acquisition are very clear about who is responsible and accountable for programs—and that’s really the trigger for understanding that you need to think strategically, because if you don’t do it, who else is going to?



Participants consistently indicated an awareness and acceptance of their role and position as responsible and accountable for the overall success of their program and stated that strategic thinking was an important part of that responsibility.

### ***Discussions***

Participants explained how having discussions across a wide range of information sources triggered their strategic thinking. These discussions included networking within communities and trusted networks deeply familiar with the business:

A lot of my initial ideas and thoughts that triggered a lot of early thinking and helped guide me in what information and data I wanted to collect were early discussions and lunches and network lunches and reaching out to graybeards and subject matter experts that knew this business, that knew this community, my own trusted network who may not know the specifics of the community but who had their own specific thoughts and expertise, bouncing thoughts back and forth on them, sharing experiences—all that continues to trigger thoughts.

A participant referred to interactions with people interested in program success:

I think most of my strategic thinking gets pinged by somebody coming in with an idea or somebody coming in saying this area needs to be worked on, or I recognize it myself, when something is just not right and makes me start thinking about is there a better way or is there some other path forward we should be taking?

Another highlighted discussions at the more detailed tactical level: “Tactical discussions always trigger personally in me strategic thinking.”

### ***Solving Problems***

Participants identified problems of a significant context that emerged as triggers for strategic thinking, including those problems that required strategic thinking to solve: “Identifying problems would be one of the reasons for strategic thinking … to identify what problems are out there and then what requires strategic thinking.” A participant highlighted problems that were more systemic in nature and that required longer-term solutions:

The identified areas within our organization or as the result of execution shortfalls that are systemic, and I don’t think I can fix in the short terms so I think more broadly about what I can do today to maybe realize a better outcome in the long term, so that’s a tactical connection to strategic.

More directly, participants closely linked the triggering of strategic thinking to problems that arose during their programs: “Really just about any problem triggers strategic thinking” and “the trigger is always a problem.”

### ***Changes in the Environment***

Participants indicated that changes in the environment could act as a trigger for their strategic thinking. Such changes could relate to changing objectives: “Something that really triggers it [strategic thinking] sometimes—it’s the rethinking … when someone changes your objective or someone makes a major change.” A participant cited needs that arose from the environment: “Then other times it’s looking at the environment. You understand that—where this is something I’m going to have to address or get better at or have an answer to because I can see that it’s going to be needed.”



## **Events**

Acquisition programs execute along planned timelines with a series of program events. A participant stated that upcoming and anticipated events could act as triggers for strategic thinking: “There’s precipitating event triggers. ... There are calendar-driven needs—i.e., end of the year, first of the year—just a time that triggers me to think through some stuff.” Knowing or becoming aware of upcoming events could trigger strategic thinking.

In summary, participants identified a broad range of triggers for their strategic thinking that occur routinely during program planning and execution activities.

## **Definition of Strategic Thinking**

The composite findings described in this section include the participants’ definitions of strategic thinking. Participants defined their strategic thinking as related to taking a holistic, long-term view; determining goals; and influencing others.

### **Taking a Holistic, Long-Term View**

Participants defined their strategic thinking as related to how they viewed the world. As a participant commented, “It’s the bigger picture.” A participant elaborated:

My definition of strategic thinking is that you have the ability across large stretches of time and across multiple different parts of an organization, the ability to put the puzzle together. It’s like a systems engineering view. ... You can zoom out and see the bigger picture and you see the map of the U.S. but you know that if you zoom in into any of those parts, the overall framework allows you to execute that big picture.

A participant related strategic thinking to coalescing salient information into master plans, “taking everything that you need to do business,” commenting that “I define strategic thinking as master planning, ... planning for the future.” In addition, a participant defined strategic thinking as a destination to include the underlying principles that help guide the organization: “It’s defining the direction of where you need to go, purpose, mission, vision.”

### **Determining Goals**

Participants defined strategic thinking in terms of determining goals and developing the means by which to achieve them. Participants addressed higher-level and future goals: “It is what your higher-level goals are” and “Trying to begin with the end in mind, trying to define what the most important objectives are to advance our mission. ... Strategic thinking is about the future and how to obtain that future.”

A participant related strategic thinking to achieving outcomes, recognizing that adjustments are required along the way:

[Regarding the strategic thinking definition] Outcome and delivered capability, ... being able to think across the span of outcomes that you need. ... It’s the enabling, it’s the implementation, it’s the adjustments along the way all tied toward what we are trying to get to and how does this help you, hurt you, keep you from or assist you in getting to that.

A participant also commented on achieving bottom-line outcomes in the far term:

Strategic thinking is looking at what sort of bottom-line outcomes are that you are trying to achieve and then considering all the steps that must occur in order to achieve that bottom-line outcome, and that outcome really needs to be a far-term outcome.



### ***Influencing Things***

Participants spent considerable time understanding their environment and developing strategies to achieve their goals. To achieve those goals, participants made efforts to influence their organizations and stakeholders. A participant defined strategic thinking in terms of an ability to influence over the horizon of the program: "Strategic thinking is defined as those things that I can influence and the horizon that is shaped by the arc of this program."

Another participant defined strategic thinking as taking a view that was well attuned to what was happening in the surroundings and being proactive to affect the outcome: "Strategic thinking is the ability to proactively look at a situation and affect external forces instead of reacting more—be proactive."

Also, a participant specifically discussed strategic thinking as related to influencing others to effect change at a fundamental level: "[Strategic thinking is] about fundamentally changing some part of an organization, ... fundamentally changing the way you do business."

In summary, participants defined their strategic thinking in terms of determining where the organization needs to go, how it needs to get there, and their proactive efforts to influence things to helping them reach their goals.

#### **Theme 1: Strategic thinking utilizes an extensive range of knowledge, abilities, and conditions that enable clarity of thought.**

This study identified that strategic thinking utilizes an extensive range of knowledge, abilities, and conditions that enable clarity of thought within the VUCA environment. Participants described the need for understanding both themselves and the world around them, as both were continually changing and evolving while thinking strategically. Participants described the ability to imagine the possibilities for the future and the need to be open-minded to new perspectives and ideas. The research findings highlighted their need to organize complex information, and both the conditions and the need to be able to make new connections and see emerging patterns to gain insights and perspectives. Participants recognized the importance of being adaptive and flexible in their changing environment as well as the ongoing desire for knowledge and wisdom when navigating the VUCA environment. Finally, participants acknowledged the importance of having the experience and knowledge that leads to wisdom.

#### **Theme 2: Strategic thinking occurs deliberately as both a high-level creative and a tactically grounded process.**

This study identified that strategic thinking occurs deliberately as both a high-level creative and a tactically grounded process. Participants described their strategic thinking as stepping back from day-to-day tactical activities to look at the big picture and consider the long term. From this perspective, participants described envisioning their future goals, how they were going to get there, and the obstacles along the way. Once these goals and a rough path to get there were determined, participants described how they thought through the what-ifs to help clarify the details of their plans and strategies.

#### **Theme 3: Strategic thinking is fueled by iterative individual and group analytical and dialogical activities to address the knowledge needed to create strategic-to-tactical linkages and frameworks.**

This study identified that strategic thinking is fueled by iterative individual and group analytical and dialogical activities to address the knowledge needed to create strategic-to-



tactical linkages and frameworks. Participants described the iterative and collaborative processes used across the range of traditional strategic planning activities, such as establishing core parameters including developing a vision, a mission, and organizational goals; conducting analytical processes; linking and translating the strategic to the tactical; establishing dynamic feedback loops; and thinking about organizational change. Participants described a series of communication activities designed to articulate clear linkages between strategic and tactical levels; persuade and build buy-in for proposed strategies; foster dialogue around strategic issues and ideas; and provide direction to their organization. Participants also described their activities used in decision-making and their extensive use of questions to address the knowledge needed to create the strategic-to-tactical linkages and frameworks. These questions were categorized into five broad categories: self-questioning to ensure against bias, questions of a fundamental nature that challenged assumptions and the basic information from which strategies were to be developed, questions about the status of their current situation, questions about the path that their organization was or was going to be on, and questions about the future, that is, where they were going and why. Participants also described their synthesis of perspectives to help clarify and refine their thoughts and ideas, how they used architectures and frameworks to help provide the linkages necessary between disparate pieces of information, and how they worked individually and collectively to interconnect information and form patterns to fill knowledge gaps.

**Theme 4: Strategic thinking is a deeply personal experience that evokes a wide range of positive and negative emotions.**

This study identified that strategic thinking is a deeply personal experience that evokes a wide range of positive and negative emotions. Participants described emotions of happiness, hope, surprise, fear, challenge, pride, interest, frustration, and sadness. This deeply personal mix of emotions is indicative of the difficult challenges they faced as well as the rewards resulting from their important efforts.

***Summary of Findings***

Overall, the essence of the experience of thinking strategically in a VUCA environment was described in terms of the difficulties and challenges associated with assessing and comprehending the ever-changing and uncertain environment, being self-aware and open to this new information, considering the full spectrum of creative possibilities while thinking holistically and synthesizing diverse perspectives, and continually thinking through how it all fits together in strategic-to-tactical frameworks or mental models. Strategic thinking occurred deliberately, as insight creation via “aha” moments when participants’ minds relaxed and were not distracted, as well as during the normal course of business. Participants identified gaps in knowledge and developed strategic questions to create the strategic-to-tactical linkages and frameworks or mental models necessary for their strategies and plans; their knowledge was then refined in an iterative fashion through feedback mechanisms. Strategy formulation started out as an idea that was unclear that evolved and matured over time as information, new questions, and new perspectives were collected and considered, much like puzzle pieces coming together to clarify a view. Participants experienced continual adaptation to their environment as they thought creatively out of the box and challenged assumptions and paradigms throughout the series of traditional strategic planning activities. Participants described difficulty balancing their time thinking between strategic and tactical activities and deliberately set aside time when they could clear their minds and think without distraction and while their minds were relaxed. Participants expressed a wide range of emotions associated with strategic thinking in a VUCA environment.



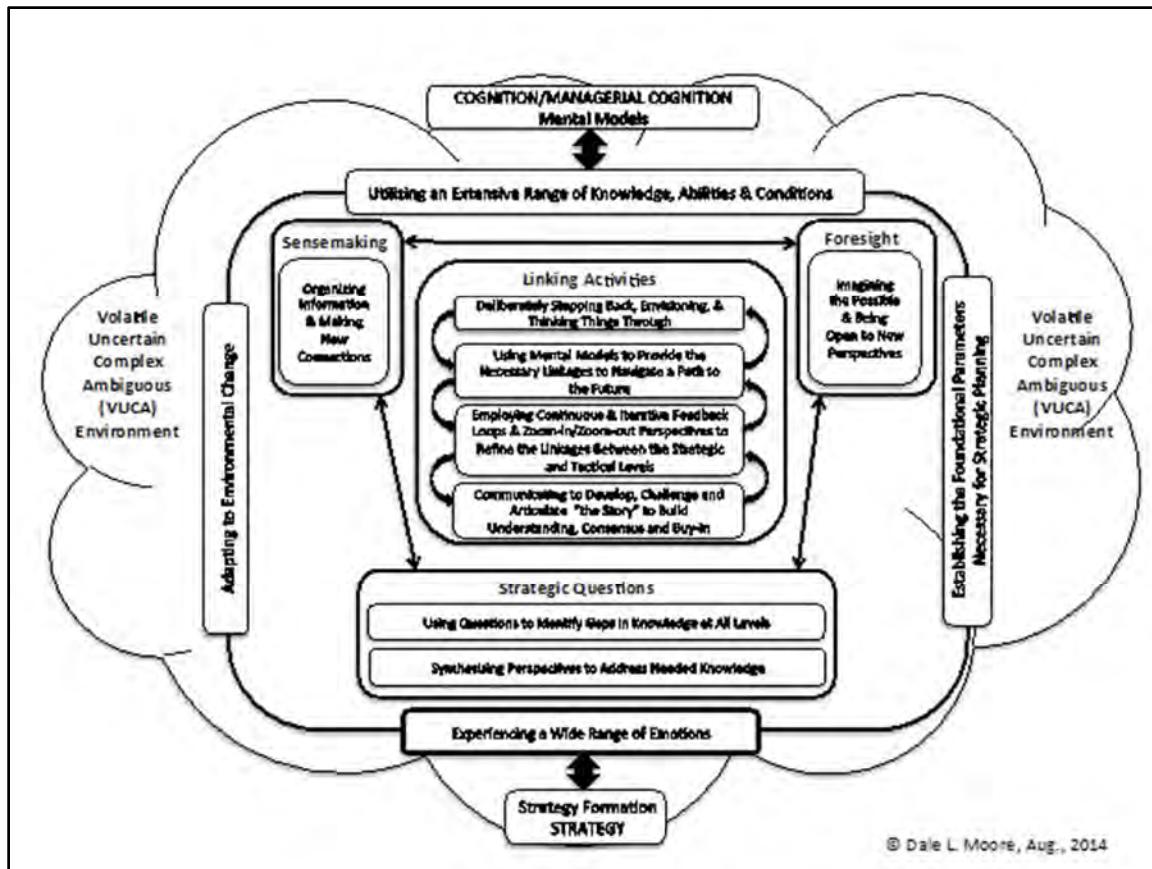
## Interpretations, Conclusions, and Recommendations

The interpretations, conclusions, and recommendations of this study focused on understanding the experience of leaders when they think strategically in complex environments. It also discusses the meaning of the results by tying them to past theory, practice, and research and extrapolating them to future theory, practice, and research. The first segment interprets the findings. Next, the three conclusions are outlined relating to the definition of strategic thinking, the characteristics of the volatile, uncertain, complex, and ambiguous (VUCA) environment, and triggers for strategic thinking. The third segment provides recommendations for theory, practice, and research, and the section closes with concluding remarks.

### ***Interpretations***

This section presents the interpretations from this study, reflecting the full set of results across the composite of textural and structural aspects of the phenomenon associated with the experience of leaders when they think strategically in a complex environment. The study found that the experience of strategic thinking in a VUCA environment encompasses a wide range of cognitive, behavioral, and emotional aspects designed to continuously adapt, explore, create, and refine strategies and tactical activities to achieve desired goals. Twelve aspects were identified that reflect the experience of leaders thinking strategically in complex environments. These aspects are (1) utilizing an extensive range of knowledge, abilities, and conditions; (2) adapting to environmental change; (3) establishing the foundational parameters necessary for strategic planning; (4) experiencing a wide range of emotions; (5) organizing information and making new connections; (6) imagining the possible and being open to new perspectives; (7) using questions to identify gaps in knowledge at all levels; (8) synthesizing perspectives to address needed knowledge; (9) deliberately stepping back, envisioning, and thinking things through; (10) using mental models to provide the necessary linkages to navigate a path to the future; (11) employing continuous and iterative feedback loops and zoom-in/zoom-out perspectives to refine the linkages between the strategic and tactical levels; and (12) communicating to develop, challenge, and articulate “the story” to build understanding, consensus, and buy-in. These 12 aspects are depicted in Figure 1 and explained in greater detail.





**Figure 1. The Experience of Leaders When They Think Strategically in a VUCA Environment**

### **1. Utilizing an Extensive Range of Knowledge, Abilities, and Conditions**

As illustrated at the top of Figure 1, the study found that participants utilized an extensive range of knowledge, abilities, and conditions during strategic thinking—and the employment of these attributes had a large impact on the process and the results. In terms of knowledge and abilities, the study identified leaders' need for well-developed mental models. Such models helped them understand themselves in terms of recognizing their personal bias and filters while ensuring that they had a sense of perspective; acknowledge the importance of a deep understanding of the business, including how the system works; and understand the large role that experience plays in one's ability to predict the future.

### **2. Adapting to Environmental Change**

The study findings align with the literature in highlighting how strategic thinking involves adapting to environmental change. The study identified that a focus on adapting and being flexible helps leaders be better strategic thinkers. In addition, the ability to adjust in the complex environment—which was characterized as a battlefield—reflected requisite mental agility and flexibility in thinking, enabling the ability to rapidly adjust during execution.

### **3. Establishing the Foundational Parameters Necessary for Strategic Planning**

This study acknowledged that the output of strategic thinking includes a vision, a purpose, and a mission and can be related to master planning, which looks at everything

needed to run the business. The study also described building plans as a constant balancing of risk, opportunity, realism, and innovation.

#### **4. Experiencing a Wide Range of Emotions**

The study findings identified a wide range of emotions experienced while strategic thinking—including happiness, hope, surprise, fear, challenge, pride, interest, frustration, and sadness. These emotions were deeply personal and were an important underlying factor in strategic thinking, which is inadequately addressed in the literature. The existing literature (Gavetti, 2012; Smith & Ellsworth, 1985) is incomplete with regard to its treatment and understanding of the emotional aspects of strategic thinking in the context of a VUCA environment. The study acknowledged a specific need to be self-aware and both recognize emotions and take action to set them aside and look at things objectively based only on the data and facts. This study added insight and perspective into understanding the emotions experienced while strategic thinking and the means and mechanisms used to surface and deal with them.

#### **5. Organizing Information and Making New Connections**

The study described the need to organize information in a complex environment, using means such as a notebook or list, both of which fostered recollection. In addition, the use of visualization served as a tool to help make sense of complex information. The study also identified how new connections between disparate pieces of information were made and new insights formed through subconscious processing during exercise or low cognitive tasking activities. This study also identified several emergent mechanisms and means by which complexity was being managed and addressed. The use of notes and lists to assist in organizing and recalling information, the mapping of information, and the abstracting of information for simplification purposes provided an important insight for strategic thinking in a VUCA environment.

#### **6. Imagining the Possible and Being Open to New Perspectives**

The study described the experience of imagining the art of the possible and thinking out of the box, while recognizing the importance of being open to new perspectives. In Figure 1, this finding is shown in the category of foresight, linking with both sensemaking and strategic questions.

#### **7. Using Questions to Identify Gaps in Knowledge at All Levels**

The study findings identified the significant use of questions as the result of gaps that were identified in knowledge at all levels while thinking strategically. These findings are consistent with the strategic thinking literature (Goldman, 2012; Kaplan & Orlowski, 2013; Mintzberg et al., 1998; Tovstiga, 2010), which recognizes the role of imaginative and conceptual thinking, as well as the foresight literature, which considers future possibilities (Conway & Voros, 2003; Cunha, 2004; Cunha, Cunha, & Clegg, 2009; Narayanan & Fahey, 2004; Seidl & van Aaken, 2009; Voros, 2003). At the same time, while the literature (Casey & Goldman, 2010; Tovstiga, 2010; Zabriskie & Huellmantel, 1991) acknowledges the important use of questions, it is incomplete in describing the variety of questions that occur while thinking strategically in the context of a VUCA environment. The questions identified in this study represent a holistic and temporal perspective of strategic thinking that extends the literature (Casey & Goldman, 2010; Tovstiga, 2010; Zabriskie & Huellmantel, 1991) to relate strategic questions to gaps in knowledge that link the strategic to the tactical levels as a coherent, credible conceptualization of a path to a desired outcome.



## **8. Synthesizing Perspectives to Address Needed Knowledge**

Synthesis of a wide range of present-day and future-oriented perspectives was a key element of strategic thinking in this study. The findings identified how perspectives were synthesized in terms of clarifying ideas and thoughts, combining and refining inputs, using architectures and frameworks, and interconnecting information in new mental models. The synthesis of perspectives was illustrated through several experiential metaphors: getting assistance to help crystallize foggy ideas; having fuzzy ideas come into focus; and viewing problems as puzzle pieces and bringing the whole picture back into focus. Also, the study illustrated how a strategic thinker's vision was changing as the result of hearing additional perspectives.

## **9. Deliberately Stepping Back, Envisioning, and Thinking Things Through**

The study findings showed that deliberate action is required to think strategically. This aspect, and the three that follow, constitute linking activities within the model (Figure 1). In this study, participants deliberately retreated from day-to-day demands to look at the bigger picture, removing themselves from the details and staying above the fray to figure out what matters most. This effort was described in several different ways: as stepping back and looking at things in aggregate; opening up the aperture to look at the big picture; envisioning a path through an obstacle course; thinking ahead with foresight; using forward thinking; understanding what is reasonable; and running what-if drills.

## **10. Using Mental Models to Provide the Necessary Linkages to Navigate a Path to the Future**

This study highlighted the utility and functionality of mental models as scaffolds—not only for identifying gaps in knowledge and triggering questions, but also for translating the conceptual and imaginary aspect of envisioning at the strategic level to the concrete and tangible tactical level and then providing the means and mechanisms to link them together into strategies and plans. This study emphasized the need to tie the tactical level with the strategic level; in that way strategy is translated to objectives and is then translated to the tactical level with reality checks along the way. Adding to the existing literature, this study provides insights regarding the use of mental models as the bridge between the conceptual and the concrete, as well as a means by which questions, individually and collectively, are created and answered in developing strategies to navigate a path to the future.

## **11. Employing Continuous and Iterative Feedback Loops and Zoom-in/Zoom-out Perspectives to Refine the Linkages Between the Strategic and Tactical Levels**

In this study, the experience of strategic thinking was described as an iterative loop that was continually updated as new strategies were created to accommodate changes in the environment. This experience was also described as iterative cycles of zooming out to get a vision or a plan and zooming in to see the details for execution. The application of zoom-in/zoom-out perspectives provides a visual reference for considering the means by which linkages are continuously refined and had been missing in the literature. Similarly, this phenomenon is related to the metaphor of a fractal, where patterns continuously repeat themselves at different levels of perspective. Mintzberg (1995) described strategic thinking as seeing in all directions, while later literature acknowledged the importance of iterative loops, which were highlighted by both Casey and Goldman (2010) and Tovstiga (2010) as ongoing and continuous.



## **12. Communicating to Develop, Challenge, and Articulate “The Story” to Build Understanding, Consensus, and Buy-In**

This study highlighted the importance of communication activities as part of a participatory process to develop, challenge, and articulate a story or message to build understanding, consensus, and buy-in. The literature (Casey & Goldman, 2010; Chermack, 2011; Hooijberg & Schneider, 2001; Jacobs & Heracleous, 2005; Jarzabkowski, Balogun, & Seidl, 2007; Jarzabkowski & Spee, 2009; Kaplan & Orlikowski, 2013; Lord, 2001; Narayanan & Fahey, 2004; Zahra & Nambisan, 2012) recognizes the importance of communication and dialogue in developing and formulating strategies, but it was found to be insufficient in addressing the mechanisms and means by which strategic thinking occurs while communicating when developing strategies.

Strategic thinking requires the creation of an environment where linkages can be explained and articulated in terms of how everything links together—where others can be persuaded, dialogue can be fostered to build understanding and consensus, and direction can be provided. This study highlighted the importance of creating the right environment that allows the team to relate what they’re doing to the bigger picture. The study identified the use of strategic thinking in persuading others to engage in building the story and foster improved decision-making and buy-in from internal and external stakeholders. It was suggested that typically leaders are trying to convey a complex problem to a senior leader to get him to make the decision, typically one that the leader wanted him to make. This was a broadly applicable concept, in that many different people are involved in complex programs.

The importance of creating the right environment to foster dialogue during strategy formulation was expressed in the study. In intensive dialogue, ideas are bounced around as thoughts and concepts are challenged, accepted, coalesced, and crystallized into new individual and collective group mental models. The study highlighted the role of asking questions and running what-if drills to challenge or “shoot holes” in proposed ideas, concepts, and strategies.

### **Conclusions**

This study indicates six areas that are not fully developed in the literature. The first four are associated with the requisite recursive linking activities that occur between sensemaking, foresight, and strategic questions associated with (1) structural aspects, the translation between the concrete tactical and the imaginary strategic levels as related to the mental models and mechanisms for linking them together into strategies and plans; (2) stratification aspects, the use of iterative zoom-in/zoom-out perspectives to help refine the linkages between the tactical and strategic levels; (3) social aspects, the mechanisms and means by which strategic thinking occurs while leaders communicate when developing strategies; and (4) physiological aspects, the deliberate behavior of stepping back, envisioning, and thinking things through. The fifth is associated with the extensive use of strategic questions to address gaps in knowledge that link the strategic to the tactical levels to create a credible path to a desired outcome. The final area relates to limitations in the literature with regard to the wide range of emotions experienced and their potential for influencing strategic thinking. These six areas provide important opportunities to both expand and clarify the strategic thinking literature.

This study determined that the experience of strategic thinking in a VUCA environment encompasses a wide range of cognitive, emotional, and behavioral activities designed to continuously adapt, explore, create, and refine strategies and tactical activities to achieve desired goals. Three conclusions were drawn from the study findings in light of the established literature:



1. Definition of strategic thinking: The definition of strategic thinking in the context of the VUCA environment can be defined as a cognitive, emotional, and behavioral phenomenon that is both high level and tactically grounded and that is fueled by individual and group analytical and dialogical activities to address needed knowledge, enable clarity of thought, and create strategic-to-tactical linkages and mental models to develop enabling strategies.
2. Characterization of the VUCA environment: The characterization of the VUCA environment needs to include the consideration of the structural elements that may impede the organization's ability to adapt and respond.
3. Triggers for strategic thinking: When determining the triggers for strategic thinking, the additional triggers of having explicit responsibility to think strategically and planned events that promote strategic thinking need to be considered for inclusion.

### ***Recommendations***

This section discusses recommendations for theory, practice, and research. These recommendations are based on the overall results of the study and the applicable literature with consideration of the limitations of both.

#### ***Recommendations for Theory***

The findings from this study suggest recommendations for (1) expanding the application of strategic thinking to include key behaviors; (2) expanding the scope of consideration for strategic thinking to include strategic-to-tactical linkages; (3) expanding the role of strategic questions and questioning; (4) expanding the strategic environment beyond VUCA to include structural impediments; and (5) incorporating the emotional aspects of strategic thinking. Each recommendation is discussed below.

#### ***Recommendations for Practice***

This study offers empirical evidence for understanding the experience of strategic thinking in a VUCA environment. The findings and conclusions of this study may have benefits for practitioners, including those responsible for helping others develop their ability to think strategically, those responsible for strategy development, and those facilitating strategy formulation. The findings from this study suggest implications for practice in five areas: (1) enhancing strategic thinking knowledge and skills; (2) stepping back to look at the big picture; (3) embracing the use of strategic questions and questioning; (4) creating the conditions that foster strategic thinking; and (5) providing the requisite emotional support for strategic thinking.

#### ***Recommendations for Future Research***

The findings and conclusions derived from this study trigger opportunities for future research on strategic thinking in a VUCA environment. Such research can address (1) the role of mental models in individual and group strategic thinking; (2) the synthesis and application of diverse perspectives; (3) the adaptation, change, and transformation of mental models; (4) the role and nature of communication; (5) the role, influence, and management of emotions; (6) the role of past experience in strategic thinking in a VUCA environment; and (7) the social contributions to strategic thinking in a VUCA environment.

### **Concluding Thoughts**

Researching the experience of leaders thinking strategically in VUCA environments provided new insights and perspectives that contributed to theory, practice, and research.



As the nature of the VUCA environment continues to extend into ever-more complex and disruptive domains, the role of leaders and their ability to think strategically become increasingly important. This study provided important contributions to the understanding and theory of strategic thinking in VUCA environments and opened the door to new areas of research as well as new approaches and considerations to improve practice. It is suggested that strategic thinking is rapidly becoming a prerequisite skill at all levels of the organization to enable success in the increasingly VUCA and bureaucratic environments anticipated for the future.

## References

Andrews, K. R. (1980). *The concept of corporate strategy* (Rev. ed.). New York, NY: Richard D. Irwin.

Barr, P. S., Stimpert, J. L., & Huff, A. S. (1992, Summer). Organizational change, strategic action, and organizational renewal. *Strategic Management Journal*, 13, 15–36.

Bonn, I. (2001). Developing strategic thinking as a core competency. *Management Decision*, 39(1), 63–71.

Bonn, I. (2005). Improving strategic thinking: A multilevel approach. *Leadership & Organization Development Journal*, 26, 336–354.

Casey, A. G., & Goldman, E. F. (2010). Enhancing the ability to think strategically: A learning model. *Management Learning*, 41, 167–185.

Chandler, A. D. (1962). *Strategy and structure*. Cambridge, MA: MIT Press.

Chermack, T. J. (2011). *Scenario planning in organizations: How to create, use and assess scenarios*. San Francisco, CA: Berrett-Koehler.

Conway, M., & Voros, J. (2003). Foresight: Learning from the future. *Journal of Institutional Research*, 12(1), 1–15.

Cornish, E. (2004). *Futuring: The exploration of the future*. Bethesda, MD: World Future Society.

Craik, K. (1943). *The nature of exploration*. Cambridge, England: Cambridge University Press.

Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Crotty, M. (2007). *The foundations of social research: Meaning and perspective in the research process*. Thousand Oaks, CA: Sage.

Cunha, M. P. E. (2004). Time traveling: Organizational foresight as temporal reflexivity. In H. Tsoukas & J. Shepherd (Eds.), *Managing the future: Strategic foresight in the knowledge economy* (pp. 133–150). Malden, MA: Blackwell.

Cunha, M. P. E., Cunha, J. V. D., & Clegg, S. R. (2009). Improvisational bricolage: A practice-based approach to strategy and foresight. In L. A. Costanzo & R. B. MacKay (Eds.), *Handbook of research on strategy and foresight* (pp. 182–200). Cheltenham, England: Edward Elgar.

De Kluyver, C. A. (2000). *Strategic thinking: An executive perspective*. Upper Saddle River, NJ: Prentice Hall.

Doyle, J. K., & Ford, D. N. (1999). Mental models, concepts revisited: Some clarifications and a reply to Lane. *System Dynamics Review*, 15, 411–415.

Fiol, M. C., & Huff, A. S. (1992). Maps for managers: Where are we? Where do we go from here? *Journal of Management Studies*, 29(3), 267–285.



Gavetti, G. (2012). Perspective—Toward a behavioral theory of strategy. *Organization Science*, 23(1), 267–285.

Georghiou, L., Harper, J., Keenan, M., Miles, I., & Popper, R. (2008). *The handbook of technology foresight: Concepts and practice*. Northampton, England: Edward Elgar.

Goldman, E. F. (2008). The power of work experiences: Characteristics critical to developing expertise in strategic thinking. *Human Resource Development Quarterly*, 19, 217–239.

Goldman, E. F. (2012). Leadership practices that encourage strategic thinking. *Journal of Strategy and Management*, 5(1), 25–40.

Graetz, F. (2002). Strategic thinking versus strategic planning: Towards understanding the complementarities. *Management Decision*, 40, 456–462.

Hamel, G., & Prahalad, C. K. (1994). *Competing for the future*. Boston, MA: Harvard Business School Press.

Hanford, P. (1995). Developing director and executive competencies in strategic thinking. In B. Garratt (Ed.), *Developing strategic thought: A collection of the best thinking on business strategy* (pp. 191–226). London, England: Profile Books.

Heracleous, L. (1998). Strategic thinking or strategic planning? *Long Range Planning*, 31, 481–487.

Hooijberg, R., & Schneider, M. (2001). Behavioral complexity and social intelligence: How leaders use stakeholders to form a systems perspective. In S. J. Zaccaro & R. J. Klimoski (Eds.), *The nature of organizational leadership*. San Francisco, CA: Jossey-Bass.

Huff, A. S., & Jenkins, M. (2002). *Mapping strategic knowledge*. Thousand Oaks, CA: Sage.

Jacobs, C. D., & Heracleous, L. T. (2005). Answers for questions to come: Reflective dialogue as an enabler of strategic innovation. *Journal of Organizational Change Management*, 18(4), 338–352.

Jarzabkowski, P., Balogun, J., & Seidl, D. (2007). Strategizing: The challenges of a practice perspective. *Human Relations*, 60(1), 5–27.

Jarzabkowski, P., & Spee, A. P. (2009). Strategy-as-practice: A review and future directions for the field. *International Journal of Management Reviews*, 11(1), 69–95.

Johnson, P., Daniels, K., & Huff, A. (2001). Sense making, leadership and mental models. In S. J. Zaccaro & R. J. Klimoski (Eds.), *The nature of organizational leadership* (pp. 79–104). San Francisco, CA: Jossey-Bass.

Jones, N. A., Ross, H., Lynam, T., Perez, P., & Leitch, A. (2011). Mental models: An interdisciplinary synthesis of theory and models. *Ecology and Society*, 16(1), 46.

Kaplan, S., & Orlikowski, W. (2013). Temporal work in strategy making. *Organization Science*, 24(4), 965–995.

Koch, R. (2006). *The Financial Times guide to strategy*. London, England: Prentice Hall.

Liedtka, J. M. (1998). Strategic thinking: Can it be taught? *Long Range Planning*, 31, 120–129.

Lord, R. G. (2001). The nature of organizational leadership: Conclusions and implications. In S. J. Zaccaro & R. J. Klimoski (Eds.), *The nature of organizational leadership* (pp. 413–436). San Francisco, CA: Jossey-Bass.

MacKay, R. B., & Costanzo, L. A. (2009). Introduction. In R. B. MacKay & L. A. Costanzo (Eds.), *Handbook of research on strategy and foresight* (pp. 1–12). Northampton, England: Edward Elgar.



Makridakis, S. (2004). Foreword: Foresight matters. In H. Tsoukas & J. Shepherd (Eds.), *Managing the future: Foresight in the knowledge economy*. Malden, MA: Blackwell.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.

Mintzberg, H. (1978). Patterns in strategy formation. *Institute of Management Sciences*, 24, 934–948.

Mintzberg, H. (1994). The rise and fall of strategic planning. *Harvard Business Review*, 72, 107–114.

Mintzberg, H. (1995). Strategic thinking as “seeing.” In B. Garratt (Ed.), *Developing strategic thought: A collection of the best thinking on business strategy* (pp. 79–84). London, England: Profile Books.

Mintzberg, H., Ahlstrand, B., & Lampel, J. (1998). *Strategy safari: A guided tour through the wilds of strategic management*. New York, NY: Free Press.

Moore, D. L. (2014). *The experience of strategic thinking in a volatile, uncertain, complex, and ambiguous (VUCA) environment* (Doctoral dissertation). Retrieved from UMI Dissertation Publishing (UMI 3633614).

Morecroft, J. D. W. (1992). Executive knowledge, models and learning. *European Journal of Operational Research*, 59, 9–27.

Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.

Narayanan, V. K., & Fahey, L. (2004). Invention and navigation as contrasting metaphors of the pathways to the future. In H. Tsoukas & J. Shepherd (Eds.), *Managing the future: Foresight in the knowledge economy* (pp. 38–57). Malden, MA: Blackwell.

Porter, M. E. (1980). *Competitive strategy: Techniques for analyzing industries and competitors*. New York, NY: Free Press.

Schram, T. H. (2003). *Conceptualizing qualitative inquiry*. Upper Saddle River, NJ: Merrill Prentice Hall.

Schwartz, M. (2010). *Defense acquisitions: How DoD acquires weapon systems and recent efforts to reform the process* (RL34026). Washington, DC: Congressional Research Service. Retrieved from <http://www.fas.org/sgp/crs/natsec/RL34026.pdf>

Seidl, D., & van Aaken, D. (2009). Anticipating critique and occasional reason: Modes of reasoning in the face of a radically open future. In L. A. Costanzo & R. B. MacKay (Eds.), *Handbook of strategy and foresight*. Northampton, England: Edward Elgar.

Seidman, I. (2006). *Interviewing as qualitative research* (3rd ed.). New York, NY: Teacher's College Press.

Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48, 813–838.

Spender, J. C. (1998). The dynamics of individual and organizational knowledge. In C. Eden & J. C. Spender (Eds.), *Managerial and organizational cognition: Theory, methods and research*. London, England: Sage.

Spender, J. C., & Eden, C. (1998). Introduction. In C. Eden & J. C. Spender (Eds.), *Managerial and organizational cognition*. Thousand Oaks, CA: Sage.

Tovstiga, G. (2010). *Strategy in practice: A practitioner's guide to strategic thinking*. West Sussex, England: John Wiley & Sons.

Tovstiga, G. (2013). *Strategy in practice: A practitioner's guide to strategic thinking* (2nd ed.). Cornwall, England: John Wiley & Sons.



Tsoukas, H., & Shepherd, J. (2004). *Managing the future: Foresight in the knowledge economy*. Malden, MA: Blackwell.

U.S. Army. (1998). *Strategic leadership primer*. Washington, DC: Author.

van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. London, Ontario, Canada: University of Western Ontario.

Vidal, L. A., & Marle, F. (2008). Understanding project complexity: Implications on project management. *Kybernetics*, 37, 1094–1109.

Voros, J. (2003). A generic foresight process framework. *Foresight*, 5(3), 10–21.

Walsh, J. (1995). Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science*, 6, 280–321.

Weber, C. E. (1984). Strategic thinking—Dealing with uncertainty. *Long Range Planning*, 17(5), 60–70.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage.

Weick, K. E., & Bougan, M.G. (1986). *Organizations as cognitive maps*. San Francisco, CA: Jossey-Bass.

Yargar, H. R. (2008). *Strategy and the national security professional*. Westport, CT: Praeger Security International.

Yukl, G. (2010). *Leadership in organizations* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Zabriskie, N. B., & Huellmantel, A. B. (1991). Developing strategic thinking in senior management. *Long Range Planning*, 24(6), 25–32.

Zaccaro, S. J., & Klimoski, R. J. (2001). The nature of organizational leadership: An introduction. In S. J. Zaccaro & R. J. Klimoski (Eds.), *The nature of organizational leadership* (pp. 3–42). San Francisco, CA: Jossey-Bass.

Zahra, A. S., & Nambisan, S. (2012). Entrepreneurship and strategic thinking in business ecosystems. *Business Horizons*, 55, 219–229.

## Acknowledgements

This dissertation would not have been possible without the help and support of several individuals. I am indebted particularly to my Dissertation Committee Chair, Dr. Ellen F. Goldman, and am grateful to the two members of my committee, Dr. Andrea Casey and Dr. Lionel C. Howard; and to my external reviewers, Dr. David Schwandt and Dr. James Leslie, for their wisdom, insights, and support.

The participants interviewed for this work were most generous with their time, and their recollections provided for a rich understanding of this phenomenon. I am especially grateful to Mr. Gary Kessler, who saw the value of this research in helping to address the formidable challenges of thinking strategically in a VUCA environment. I am also grateful to the Flag Officers who enthusiastically supported this research: VADM (Ret.) David Architzel, VADM David Dunaway, VADM Paul Grosklags, RADM Randolph Mahr, RADM Donald Gaddis, RADM Mathias Winter, and RADM Mark Darrah.

I would also like to thank the dedicated members of the NAWCAD Strategic Cell for their passion, commitment, and relentless support for naval aviation's future and for the strategic thinking necessary for its long-term success.





ACQUISITION RESEARCH PROGRAM  
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY  
NAVAL POSTGRADUATE SCHOOL  
555 DYER ROAD, INGERSOLL HALL  
MONTEREY, CA 93943

[www.acquisitionresearch.net](http://www.acquisitionresearch.net)